

TCT Food Web Model Meeting Notes

Portland, OR
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Participants:

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Proposed Approach

EPA selected moving forward with LWG's 2009 generic (non-site-specific) Gobas FWM with modifications to more sensitive parameters where site-specific sufficient empirical data exists. The rationale behind this is that it will be easier to explain to LWG that EPA is still using the model, just not the version they provided to EPA that was never approved and for which they did not provide all requested information.

Action Items

- Communicate with LWG EPA's intention going forward with respect to use of the 2009 Gobas FWM with site specific parameter modifications in developing human health PRGs. EPA has a meeting scheduled with LWG to discuss the use of the model for dioxins/furans but now Kristine Koch thinks this meeting should be expanded to discuss the model use overall.
- Modify handling of water (use original 2009 model approach).
- Select appropriate input parameters (model contains 90 input parameters) for model re-run.
 - Burt Shephard will provide Elizabeth Allen with a list of parameters that should be re-set at default, which should be site-specific
- EPA is still making a decision about the approach for dioxins/furans. EPA will be evaluating five congeners as a potential change from the current total dioxins/furans approach.

PRG values are going to be one of the things that PRPs are going to look most closely at and we need to make sure the process of determining those is thorough.

CONTEXT for Proposed Approach and Action Items

Meeting Goal

To discuss the use of LWG's Food Web Model (FWM) and finalize the approach to define PRGs for Portland Harbor. The FWM predicts tissue concentrations based on sediment concentrations. The model is calibrated using real tissue data.

EPA will be developing site-wide PRGs. EPA will not be setting different values for different PRPs or different parts of the site. We will have one standard throughout the site.

- PRGs will be established to ensure that the home range is protected (i.e., at an appropriate spatial scale).
- PRGs will be established to protect to the highest exposure expected at the Portland Harbor Superfund Site. We cannot leave areas of higher concentrations because if people fish in that area they will have unacceptable exposure. Need to be protective under all circumstances.
- Cleanup goals need to be defensible as they will go into the ROD.

Food Web Model Issues

Elizabeth Allen identified the following issues with LWG's 2012 FWM.

Issue 1

The FWM was only used to calculate human health PRGs. Why was it not used for calculating ecological PRGs?

- It was noted in the subsequent discussion that LWG's 2009 FWM report was never formally approved by EPA. Larry Burkhard, EPA, reviewed the LWG's FWM model in 2008 (as part of the Round 2 Report) and approved it for decision-making. A copy of his review comments is attached to these notes for review. Mr. Burkhard found that LWG's model was consistent with the relationships he saw at other sites. Burt Shephard, EPA, also reviewed the model and provided comments. Mr. Shephard's comments are also attached to these notes for reference. EPA's general comments were that LWG's FWM was over-calibrated.

It was also noted that EPA did not verify whether LWG revised the FWM to address the previous comments that were submitted. Burt Shephard quickly skimmed through some of the information (e.g., pore water parameters) from LWG's 2012 FWM during the meeting and indicated that it did not appear LWG had addressed EPA's comments.

- In the 2009 version, there was a modification to how water input was used from the 2012 model. The 2009 model was modified to account for filtered water concentration.

When we get to calculating PRGs, we need to determine the water concentrations we use. Surface water should achieve surface water ambient water quality criteria. Elizabeth reverted back to the equation used in LWG's 2009 FWM. She re-ran LWG's 2012 model and it gives higher sediment PRGs.

- The ecological team chose to use simpler, different models for ecological PRGs such as BSAFs (which are a type of FWM) because they were not interested in a site-wide average. Ecological receptors have a different dietary model than human receptors. Further, DDX cannot be modeled correctly using LWG's FWM. BSAFs can be used to develop these relationships and were used to develop the DDX relationship for birds. The ecological team used more reach-specific models. The model was narrowed down to appropriate exposure ranges for specific species like smallmouth bass with a smaller home range than site-wide. In addition, LWG's FWM cannot be used for water-soluble chemicals or metals like mercury. The model can only be used by persistent organic chemicals like PCBs and dioxins/furans.

Issue 2

Various intermediate parameters were input into the model that were supposed to be based on empirical data but the calibration showed that these values fell outside the empirical ranges. LWG was trying to get the data to fit the 10% target EPA requested so they tweaked a lot of parameters to make it fit.

- LWG used a Monte Carlo analysis. They allowed individual parameters to vary and then used statistical analysis to determine these values.
- Inputs to the model need to be calibrated with empirical site data; but when site data is input into the model it does not correlate well.
- Lack of tissue data at the site is a big issue with concern over accuracy.
- Burt Shephard indicated there are 21 site-specific input parameters and a total of 90 parameters that can be tweaked within the Gobas model used by LWG. Burt requested that LWG validate the 3-D model which they did not do. LWG calibrated to the Round 2 data which is questionable; lipids did not match and other parameters did not match.
- LWG's Draft 2012 FS appendix on the FWM provides the code and table of input parameters, but there is no information on calibration. Bruce Jacob indicated the EPA's FS should be more comprehensive in terms of providing more information. Elizabeth Allen indicated EPA's current FWM appendix needs to be modified to make it more comprehensive.

Issue 3

The model is calibrated for Portland Harbor data, but this creates an issue of calibrating the model to a contaminated site. Is the model still accurate at low sediment concentrations post-cleanup?

- The FWM is intended to be dynamic. Another use is sediment prediction over time and impact on tissue concentration in future.

Fundamental Question

Is it ok to use the model? What do we need to do to modify it to make it defensible? It should be noted that key COCs driving the cleanup (e.g., PCBs) are based on the FWM. It is likely the PRPs will dispute if their model is not used so we need to provide the basis for any decision to use a different model or modify LWG's model. Also, moving to a different approach will take a lot of time.

- What spatial scale was tissue modeled over? Is not accurate to compile all fish tissue and all sediment data across the entire site as we will not get a good correlation. This approach may work for the species with a large home range (e.g., carp). However, other species like smallmouth bass with a smaller home range will not correlate well if you model the spatial scale across the entire site. It would be better to model by reach but we currently do not have the tissue data to accomplish this effort. Elizabeth Allen noted that fisherman typically fish in certain spots and not across the entire river so the fish consumption exposure range is also smaller than site-wide.
- BSAF models are simpler and can be used to develop relationships between tissue and sediment concentrations.
- It was also suggested that LWG's model could be used if it was reverted back to default parameters (i.e., not over-calibrated/modified).
- If we revert back to the original Gobas model, then we would just need to input the site-specific data so it should not take that long.

Problems with LWG's Model

- LWG changed default parameters in places where they did not have empirical data, or the data was very limited.
- Calibrated values fall out the empirical range.
- LWG received feedback on the model from EPA and it does not appear to have been revised to address these comments.

LWG's FWM History

2005	First FWM Report
2009	Bioaccumulation Modeling Report
2012	Draft FS Report

Alternative Options:

The group identified three potential options for moving forward. These options are:

1. Use LWG's 2012 FWM
2. Use LWG's 2009 Gobas FWM with site-specific parameter modifications
3. Use BSAFs

Alternative	LWG's 2009 Gobas FWM with site-specific parameter modifications	LWG's 2012 FWM	BSAFs
Pros	<ul style="list-style-type: none"> Model being used now, avoids extensive dispute Can use surface water concentration data in model, which is good if remedy does not hit target and you need to cleanup water sources 	<ul style="list-style-type: none"> Model being used now, avoids extensive dispute 	<ul style="list-style-type: none"> Only method that can derive PRGs for chemicals where there is no relationship between sediment concentrations and tissue concentrations Consistent with ecological approach Applicable to large groups of chemicals Easy to understand
Cons	<ul style="list-style-type: none"> Not approved - comments on calibration not addressed Limited to organic chemicals; cannot be used for PAHs without additional modifications Takes some effort to develop PRGs from the model Inconsistent with ecological methodology Difficult to understand and low transparency 	<ul style="list-style-type: none"> Extensively modified/ calibrated from the 2009 version to get it to "fit" the data Not approved - comments on calibration not addressed Limited to organic chemicals; cannot be used for PAHs without additional modifications Takes some effort to develop PRGs from the model Inconsistent with ecological methodology Difficult to understand and low transparency 	<ul style="list-style-type: none"> May be considered too simple by some individuals for decision-making purposes Not currently being used Unable to modify parameters Insufficient data for site-specific correlations
Decision	Retained for further consideration	Screened out	Retained for further consideration

Input Parameter Discussions

- PCBs – issue of the use of congeners or Aroclors for human health. Elizabeth Allen indicated she would prefer the use of Aroclor data. Non-cancer risk associated with in utero impacts is driving the PRG for PCBs, not cancer risk.
- Temperatures – Need to determine an appropriate temperature range given the sensitivity of the model to this parameter. Determine impact of temperature variations on resulting PRGs.
- Need to look at standard error/mean versus data distribution when determining appropriate input parameters. DEQ suggested using a range of values for some parameters that are more sensitive (like temperature).
- Sensitivity analysis conducted by LWG indicated K_{ow} is the most sensitive parameter (i.e., small changes in K_{ow} cause large changes in results).